REMARKS

Claims 1-11 were previously pending in the present application. In an Office Action mailed May 23, 2003, Claim 6 was objected for informalities; Claim 8 was rejected under Section 112 for being indefinite; Claims 1-4, 6-9, and 11 were rejected under Section 103(a) based on Amer et al. (Amer) in view of U.S. Patent No. 5,251,980 to Hiraoka; Claim 5 was rejected under Section 103(a) based on Amer. in view of Hiraoka; and Claim 10 was rejected under Section 103(a) based on Amer. in view of Hiraoka and U.S. Patent No. 5345814 to Cur et al.

By this amendment, the specification and Claims 1, 4, 6 and 8 have been amended to provide more clarity and to resolve the Examiner's objections. No new matter has been added.

The application currently contains pending Claims 1-11. Applicants respectfully request reconsideration of the application in view of the above amendments and the following remarks.

A. Claim Objections

Claim 6 was objected to because of informalities. Applicants amended "the suitability" in line 1 with—a thermal conductivity—as suggested by Examiner. Therefore, amended Claim 6 is now believed to be in conformance with the Examiner's formality requirements. No new matter has been added.

B. Response to Section 112 Rejection

Claim 8 stands rejected under Section 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter Applicants regard as the invention. Examiner rejected Claim 8 on the grounds that the preamble of the claim is directed to a method of manufacturing, while the body of the claim is directed calculating of the thermal conductivity of an object and that no steps of manufacturing of a heat insulating material has been described.

In consideration of Examiner's suggestion, Applicants amended Claim 8 to read "method of manufacturing a heat insulating material with thermal conductivity pre-measured".

Remaining portions of Claim 8 refer to manufacturing steps of the thermal conductivity pre-measured heat insulating material. The method of Claim 8 describes a significant portion, "measuring the thermal conductivity" in the entire process of manufacturing the heat insulating material whose thermal conductivity is pre-measured. Manufacturing the heat insulating material without measuring the thermal conductivity can be driven from common knowledge among persons with skill in this art. Therefore, this amendment should clear Examiner's rejection based on Section 112.

C. Response to Section 103(a) Rejection-Claims 1-4, 6-9, 11

Claims 1-4, 6-9, 11 were rejected under Section 103(a) as being unpatentable over Amer in view of Hiraoka. The Examiner suggested that Amer discloses determination/calculation of an object by determining a temperature difference, delta T, in a vertical direction of a material of known conductivity vertically aligned with the object. Examiner suggested that Hiraoka in Figs. 3c-1, II and 18-19 discloses a heat resistant material 1, an object 100, and a heater 21 in a substantially vertical axis. Applicants respectfully disagree.

1. Steady State Requirement of Amer and Hiraoka

Among others, the most significant difference between the present invention and the cited references is whether a user of the device/method needs to wait for the steady state. Both Amer and Hiraoka have such a requirement of waiting for the steady state.

Amer, lines 5-12, page 342, discloses the use of equations for calculating the thermal conductivity under the steady state. Further, Amer, lines 21-23, discloses "[s]teady-state heat flux through the specimen is determined from the average temperature gradients in the upper and lower aluminum slabs and the thermal conductivity of the aluminum is obtained from reference". This page clearly shows that Amer requires the steady state.

Hiraoka, as shown in Fig. 18, has a heat sink 5 so as to create a steady state within the system. Understanding from the Equations (1) and (6), Hiraoka needs to do so because it can conduct the measurement only upon/after the temperature difference ΔT becomes steady.

Further, Amer is designed to measure the heat conductivity of thin material with e.g., 50-1000μ m thickness, as stated in page 340 of Amer. Hiraoka is also designed to measure the heat conductivity of thin film.

It is well-known that creating a steady state requires a long period of time and that more time is required for thicker material with lower thermal conductivity. Because both Amer and Hiraoka deal with extremely thin film type materials, their method/device do not require as much time as when dealing with a thicker material such as heat insulating materials. More details regarding how the steady state can be created may be understood by reading the attached ASTM section entitled "Steady-State Thermal Transmission Properties By Means Of The Heat Flow Meter". If Amer and Hiraoka were to test the heat conductivity of heat insulating materials, they would not be practical because of an enormous amount of time necessary to reach steady state.

Were the present invention to wait for the steady state, achieving the steady state of the heat insulating material as stated in the first page of the specification takes about 1 hour. However, the present invention determines the thermal conductivity by simple calibration curve in about 120 seconds without waiting for the steady state. This is a critical difference between the present invention and Amer in view of Hiraoka.

2. Different Heat Flow of Amer and Hiraoka

Amer as best represented in its Figs. 1 and 2 discloses a technology of thin film thermal conductivity meter where thick aluminum cylindrical slabs are used to sandwich the test specimen. As shown in Fig. 2, heat shows an upward vertical flow from a heater (one direction).

Hiraoka as best represented in its Fig. 18 discloses a technology of measuring thermal conductivity by generating heat in a thin film heater 21 positioned between an object and a heat resistant material, and causing the heat to conductively, mainly flow horizontally between the object and the heat resistant material. That is, Hiraoka '980 receives and measures the temperature difference in a horizontal direction. Because of the horizontal temperature measurement, the size of a heat generating area, i.e., the thin film heater 21, cannot be a significantly important factor for the temperature measurement. Further, thermal conductivity of Hiraoka around the heat generating area is also horizontal and therefore factors such as surface

temperature and the shapes of the object and the heat resistant material greatly influence on the thermal conductivity, which must be taken into account. Accordingly, accomplishing precise and accurate measurement with the Hiraoka system is difficult.

The present invention discloses a technology of measuring thermal conductivity by generating heat between surfaces of the object and a heat resistant material; causing heat vertically flowing from the heater to both directions, i.e., toward the surfaces of the objects and the heat resistant material.

C. Response to Section 103(a) Rejection-Claim 10

Claim 10 stands rejected under Section 103(a) as being unpatentable over Amer and Hiraoka in view of U.S. Patent No. 5345814 to Cur et al (Cur).

For the same reason stated and explained above, Claim 5 is patentable under Sections 103(a) over the combination of Amer and Hiraoka in view of Cur.

D. Response to Section 103(a) Rejection-Claim 10

Claim 10 stands rejected under Section 103(a) as being unpatentable over Amer and Hiraoka.

For the same reason stated and explained above, Claim 5 is patentable under Sections 103(a) over the combination of Amer and Hiraoka.

E. Amended Title

In an Amendment dated March 6, 2003, applicants requested that the title of the application be amended to read "THERMAL CONDUCTIVITY MEASUREMENT METHOD AND INSTRUMENT AND METHOD OF PRODUCING A HEAT INSULATING MATERIAL". Although the amended title is shown on the U.S. Patent Office PAIR database, the Examiner did not acknowledge it in the May 23, 2003 communication. Applicants respectfully request that the Examiner acknowledge the amendment in the next communication.

F. Conclusion

In light of the foregoing, all of the pending claims are in condition for allowance. Applicants therefore respectfully request reconsideration of the application and allowance of all pending claims. If Examiner wishes to discuss the above-noted distinctions between the claims and the cited references, or any other issues, the Examiner is encouraged to contact the undersigned attorney by telephone.

Respectfully submitted,

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Enclosures:
Postcard
Article entitled "Steady-State Thermal Transmission Properties By Means Of The Heat Flow Meter"

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